Volume 75

Number 9

ARCHIVES OF PEDIATRICS

SEPTEMBER 1958

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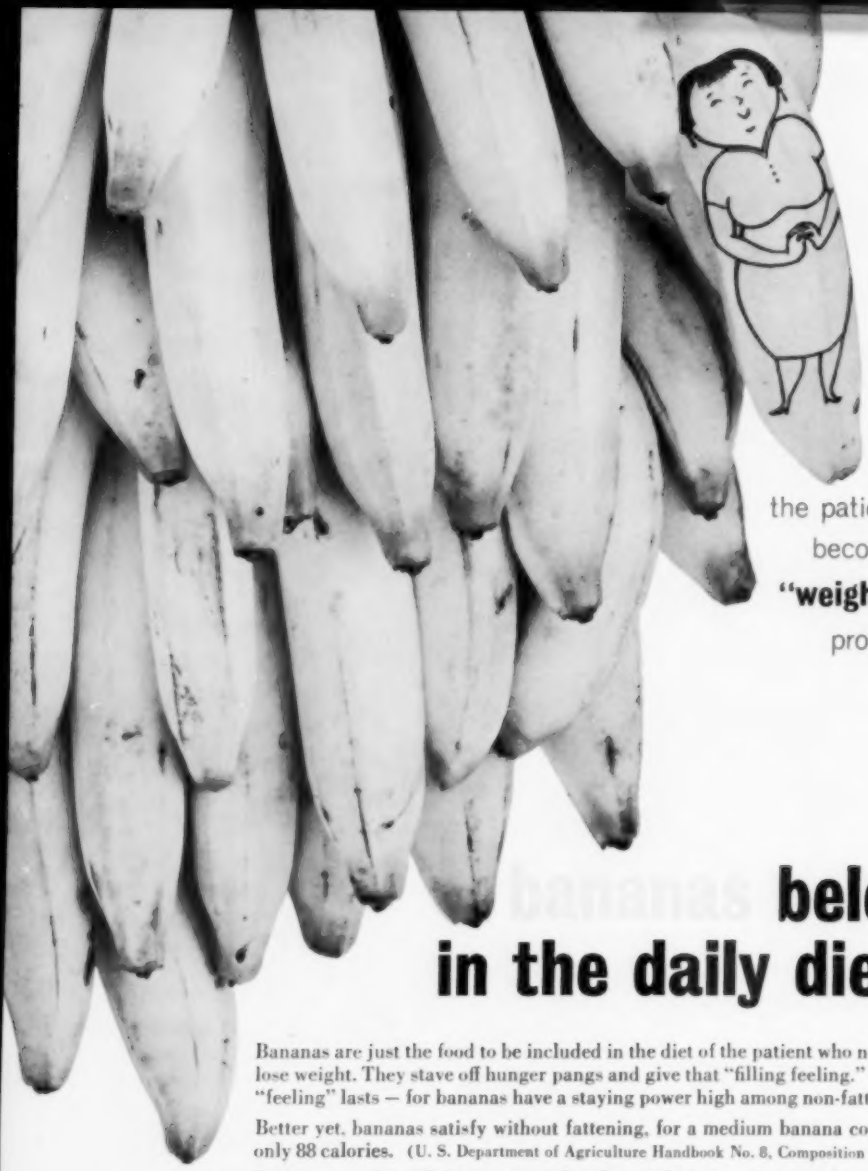

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Vol. 75 No. 9

September 1958

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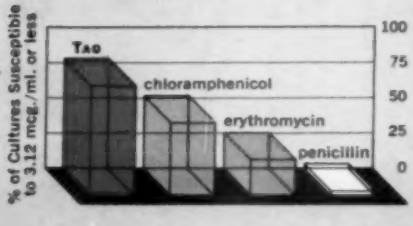

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The Cover . . . *Hieronymus Mercurialis (1530-1606) was among the valuable early contributors to pediatrics. One of his outstanding works, "De Morbis Puerorum" was published in Venice in 1603. Repeating many of the teachings of the Greeks and Romans, Mercurialis was original in his discussion of stammering and "struma" in children. ("Pioneers of Pediatrics", Copyright 1943—by Abraham Levinson, M.D.)*

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The noble art of medical writing seems not always to find its way to a deserved place in the world of journalism But history is frequently a compensating factor. It often gives the richest inheritance of all to the "fourth estate" by keeping alive those prominent personalities who build the very stature of their field. Happily, this has been the heritage of *Archives of Pediatrics*. Throughout its life, the editorial guiding and contributions of many giants of medicine have underscored the high purpose which inspired the founding of the magazine three quarters of a century ago. The pre- and post-century nurturing of its pages by such pioneers of pediatrics as Jacobi, Northrup, Morse, Chapin, Holt, etc, has given fulfillment to the promise of its future. Since undertaking the revitalizing of *Archives* ten months ago, it has been a source of satisfaction to me to witness the magazine's steady return to vigor. Many of the strengthening steps have come as a result of the continuing and dedicated efforts of the doctors—the pediatricians—who make up its editorial board. It is especially gratifying to note that their active personal contributions have helped materially in the improvements being achieved The growing confidence being evidenced by the magazine's subscribers and friends encourages us to redouble our purpose.

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1. New and Unused Therapeutics Committee, Am. Coll. Allergists: Ann. Allergy 16:237 (May-June) 1958. 2. Spielman, A. D.: Ibid. p. 242. 3. Idem: New York J. Med. 57:3329 (Oct. 15) 1957.

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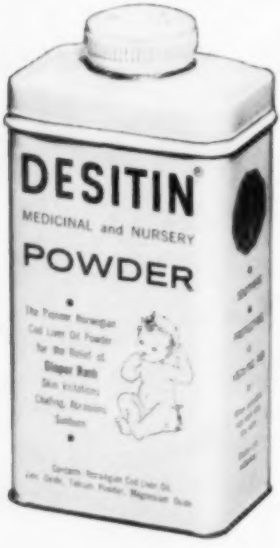

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ARCHIVES OF PEDIATRICS

Vol. 75 SEPTEMBER, 1958 No. 9

EDITOR'S NOTE: With pride, ARCHIVES publishes again—after more than a half century—Dr. Beardsley's report of the first case of pyloric stenosis. The original paper appeared in this country 170 years ago. . . . we feel that the note by Sir William Osler, to use his own words, "excites a good deal of interest", and now to bring the subject up to date, we are gratified to present Dr. Edward J. Donovan's analysis and reaffirmation of this important diagnostic report.

(Dr. Donovan, an outstanding authority on the subject, has performed over 700 operations for this condition.)

CONGENITAL HYPERTROPHIC STENOSIS OF THE PYLORUS*

HEZEKIAH BEARDSLEY, M.D.

New Haven, Conn.

* Note by Professor William Osler. Cautley and Dent in a recent paper (Lancet, December 20, 1902) state that the first record of this disease, which is now exciting a good deal of interest, dates back to 1841. The report here given by Dr. Beardsley of a very clearly and accurately described case, is, I think, worth republishing. It appears in the earliest volume of medical transactions issued in this country, entitled "Cases and Observations by the Medical Society of New Haven County in the State of Connecticut," New Haven, J. Meigs, 1788. Reprinted from the ARCHIVES OF PEDIATRICS, April, 1903.

A child of Mr. Joel Grannis, a respectable farmer in the town of Southington, in the first week of its infancy, was attacked with a puking, or ejection of the milk, and of every other substance it received into its stomach almost instantaneously, and very little changed. The feces were in small quantity and of an ash color, which continued with little variation till its death. For these complaints a physician was consulted, who treated it as a common case arising from acidity in the prima via; the testaceous powders and other absorbents and correctors of acid acrimony were used for a long time without any apparent benefit. The child, notwithstanding it, continued to eject whatever was received into the stomach, yet seemed otherwise pretty well, and increased in stature nearly in the same proportion as is common to that state of infancy,

but more lean, with a pale countenance and a loose and wrinkled skin like that of old people. This, as nearly as I can recollect at this distance of time, was his appearance and situation when I was first called to attend him; he was now about two years old. I was at first inclined to attribute the disorder to a deficiency of the bile and gastric juices, so necessary to digestion and chylification, joined with a morbid relaxation of the stomach, the action of which seemed wholly owing to the weight and pressure of its contents, as aliment taken in small quantities would often remain on it, till, by the addition of fresh quantities, the whole or nearly all, was ejected; but his thirst, or some other cause, most commonly occasioned his swallowing such large draughts as to cause an immediate ejection, and often-times before the cup was taken from his mouth. It did not appear that he was attended with nausea or sickness at his stomach, but he often complained that he was choked, and of his own accord would introduce his finger or the probang, so as to excite the heaving of the stomach and an ejection of its contents; the use of this instrument was generally necessary if the stomach did not of itself, in a few moments, discharge its contents, the choking would in that short space of time become almost intolerable, which by this discharge was entirely removed. In this situation, with very little variation of symptoms he continued till death closed the painful and melancholy scene, when he was about five years of age. He was uncommonly cheerful and active considering his situation. A number of the most respectable medical characters were consulted and a variety of medicines was used to little or no effect. His death, though long expected, was sudden, which I did not learn till the second day after it took place. This late period, the almost intolerable stench, and the impatience of the people who had collected for the funeral prevented so thorough an examination of the body, as might otherwise have been made. On opening the thorax, the esophagus was found greatly distended beyond its usual dimensions in such young subjects; from one end to the other of this tube, between the circular fibres which compose the middle coat, were small vesicles, some of which contained a tablespoonful of a thin fluidlike water, and seemed capable of holding much more. I next examined the stomach, which was unusually large, the coats were about the thickness of a hog's bladder when fresh and distended with air; it contained about a wine pint of a fluid exactly resembling that found in vesicles before mentioned, and which I supposed to have been received just before his death. The pylorus was invested with a hard compact substance, or schirrosity, which so com-

pletely obstructed the passage into the duodenum, as to admit with the greatest difficulty the finest fluid; whether this was the original disorder, or only a consequence, may perhaps be a question. In justice to myself I ought to mention, that I had pronounced a schirrosity in that part for months before the Child's death. On removing the integuments of the abdomen, I was struck with the appearance of the vesica fellis, which was nearly five inches in length and more than one in diameter; it lay transversely across the abdomen, and was bedded into the small intestines, which were sphacelated wherever they came in contact with it; its contents were rather solid than fluid, and resembled flesh in a highly putrid state; its color was that of a very dark green, like the juice of the night-shade berry, and a fluid of the same color exuded through its sphacelated coats. The necessity there was of interring the body that evening, put a stop to any further examination.

I should have been happy, gentlemen, if I had been able to have given you a more particular and accurate description of this very singular case, but the above mentioned circumstances forbade.

CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

EDWARD J. DONOVAN, M.D.

New York

In several papers which I have written on Congenital Pyloric Stenosis I have given Hezekiah Beardsley, M.D. credit for reporting the first case in this country, yet I cannot recall just where I obtained this information but I am sure that it was found in some paper on this subject as I have seen it referred to several times in the literature. Not only did Dr. Beardsley diagnose the condition correctly, but under considerable inconvenience obtained enough of an autopsy to verify his suspicions.

There are several points in the history of the case which are not quite as we know them today and I would like very briefly to call them to your attention: 1. It is very unusual for a baby with pyloric stenosis to vomit when he is one week old. 2. There is no mention made of the projectile nature of the vomiting which is so characteristic of pyloric stenosis that it could hardly be overlooked. 3. Dr. Beardsley stated that he thought that the baby was suffering from a "deficiency of bile," yet he did not mention that the vomitus con-

tained bile as it should have done if the obstruction were distal to the pylorus. 4. It is quite characteristic for a pyloric baby to vomit while he is being fed as Dr. Beardsley so vividly describes—"before the cup could be removed from his mouth." 5. We have always been taught that if a pyloric baby survives the first three months of life, the symptoms disappear and he recovers completely, yet Dr. Beardsley's patient continued to vomit until he died at the age of five years.

The autopsy findings are quite as they might be with a case of pyloric stenosis: 1. The dilated esophagus and stomach denote complete obstruction of long-standing at the pylorus. 2. The marked thickening at the pylorus could well be a pyloric tumor. 3. Patients who have had typical symptoms of pyloric stenosis in infancy have lived to a good old age without an operation, so that I do not consider the fact that Dr. Beardsley's patient died at the age of five years to be against a diagnosis of pyloric stenosis. 4. Dr. Beardsley mentions the enlarged gallbladder (vesica fellis) which because of its size may well have contributed to the dilatation of the stomach by pressure upon the pylorus or duodenum.

It is my belief that this baby had congenital pyloric stenosis and I feel that Dr. Beardsley deserved great credit for having made this diagnosis which at that time was extremely unusual.

862 Park Avenue

FOOD ALLERGY IN CHILDHOOD*

FREDERIC SPEER, M.D.**

Kansas City, Kans.

Although food allergy in childhood is usually not a serious problem, it is a remarkably common problem and the source of a tremendous amount of suffering. Its chronic, bizarre manifestations commonly cause widespread parental anxiety, and it is not unusual for the mother of an affected child to consult the physician wondering about the possibility of some grave disease about which she has been reading in the women's magazines.

In the presence of asthma, allergic rhinitis, severe eczema, or other major allergy, a full dress allergy survey is indicated, but most day-by-day problems should be the responsibility of the child's own doctor. It is for the purpose of presenting a practical method of dealing with these cases in pediatric and general practice that this paper has been written.

COMMON MANIFESTATIONS

Of the multitude of manifestations which have been reported from food allergy, there are a few which are of everyday importance. These will be given brief discussion.

Gastrointestinal System. Among the most common food allergy symptoms are abdominal pain, constipation, diarrhea, and vomiting. Pain and constipation are common in older children, vomiting and diarrhea in young children. Also of frequent occurrence is aphthous stomatitis or canker sores. Common causes of this manifestation are: tooth pastes, walnut, coconut, pineapple, food dyes, and tomato. A common minor symptom in food allergy (especially in milk allergy) is foul breath. It is occasionally the mother's chief complaint, especially where the victim is a teenager.

Nervous System. The role of allergy in nervous disorders is widely overlooked. Frontal headache is a very common finding, and allergic migraine is not as unusual as has been supposed. Often the child presents a clinical picture of vague illness, irritability, fatigue,

*Presented at the Postgraduate Allergy Conference, University of Nebraska College of Medicine, Omaha, May 8, 1958.

**From the Pediatric Allergy Clinics, The University of Kansas Medical Center and Children's Mercy Hospital, Kansas City.

hyperhidrosis, and pallor. This syndrome of tension-fatigue often responds dramatically to food elimination.[4]

Skin. The role of allergy in eczema is so familiar and has received so much attention that the importance of other factors like seborrhea, inhalants, contactants, infection, etc. are commonly forgotten. This is the only place where food allergy has been "oversold." Also of common occurrence in food and drug allergy are urticaria and angioedema,

Respiratory System. The study of asthma and nasal allergy should always include consideration of foods, but, except in infancy, foods are rarely the sole cause.

Genito-urinary System. The possibility of food allergy should be considered in frequent urination, enuresis, and vulva irritation. Although food allergy is not a common cause of enuresis, failure to find a causative food will lead to failure in treatment.

IMPORTANT FOOD ALLERGENS

The detection of food allergens is greatly facilitated if the investigator knows those most likely to cause trouble. In the following outline, foods are classified according to their relative importance in pediatric allergy.[5] It will be seen that foods known to be common offenders in adults do not appear to be specially common in children. Wheat, for example, a very common allergen in adults,[2] is of secondary importance in children. This is also true of fish, potato, beef, and nuts.

Incidence of Food Allergens*:

Very Common:	Milk
	Chocolate and cola
	Egg
	Legumes (pea, bean, peanut)
	Corn
	Citrus fruits
Fairly Common:	Tomato
	Strawberry
	Wheat, barley, rice
	Beef
	Pork

* For children in Middlewest; incidence may not apply in other geographical areas.

Potato
Food dyes
Walnut-pecan
Cinnamon
Fish

Occasional: Apple, pear, aspirin, banana, grape, rye, oats, lettuce, pineapple, black pepper, cabbage, cauliflower, broccoli, onion, mustard, shrimp, coconut, spinach, carrot, celery, lamb, plum, peach, apricot, almond, mushroom, chicken.

Rare: Blueberry, cranberry, eggplant, peppers, red pepper, buckwheat, rhubarb, tapioca, ginger, papaya, olive, avocado, honey, maple sugar, currant, gooseberry, okra, allspice, clove, tea, fig, asparagus, date, nutmeg, chicle, wintergreen, peppermint, sage, Brazil nut, turnip, radish, sweet potato, melons, cucumber, coffee.

BIOLOGIC RELATION OF FOODS

The study of food allergy was made much more simple and exact by the discovery that allergy to a given food throws strong suspicion on foods of the same biologic family.[6] This is notably true of such families as legumes and citrus fruits, less so of the grains and tomato family, and scarcely true at all of the mammal family. Allergy to milk bears little relation to beef allergy, and there seems to be no cross relation between chicken and egg. However, the meat of hen may contain enough egg antigen to give trouble in severe egg allergy.

Excellent lists which cover the entire American dietary are available,[2] but in the following outline, only those foods commonly eaten by children are included. Forty food families follow. Where only one food of the family is commonly eaten, the name of the family is not given.

1. Apple family: Apple and pear
2. Banana
3. Beet family: Beet and spinach
4. Blueberry family: Blueberry and cranberry
5. Black pepper.
6. Buckwheat family: Buckwheat and rhubarb
7. Cashew family: Cashew and pistachio
8. Chocolate family: Chocolate and cola
9. Citrus family: Orange, lemon, grapefruit, tangerine, lime

10. Coffee
11. Ginger
12. Gooseberry family: Gooseberry and currant
13. Grains: Wheat, corn, rice, oats, barley, rye
14. Grape
15. Hazelnut
16. Honey
17. Laurel family: Avocado, cinnamon, bay leaves
18. Lettuce (artichoke in same family)
19. Mallow family: Okra and cotton seed
20. Melons: Watermelon, cucumber, squash, cantaloupe, pumpkin
21. Mustard family: Cabbage, cauliflower, broccoli, Brussels sprouts, turnip, radish, mustard
22. Myrtle family: Allspice and clove
23. Nutmeg
24. Olive
25. Onion family: Onion, garlic, chives, asparagus
26. Palm family: Coconut and date
27. Parsley family: Carrot, parsnip, dill, parsley, anise
28. Pea family (legumes): Pea, all types of bean, peanut
29. Pineapple
30. Plum family: Plum, cherry, apricot, peach, almond
31. Potato family: Potato, tomato, eggplant, peppers, tobacco, red pepper
32. Rose family: Strawberry, raspberry, blackberry
33. Sweet potato (morning glory family)
34. Tea
35. Walnut family: Walnut, pecan, hickory nut
36. Mollusks: Oyster and clam
37. Crustaceans: Shrimp and lobster
38. Fish
39. Fowl: Chicken and turkey; Egg
40. Mammals: Pork, beef, lamb; Cow's milk and goat's milk
41. Food colors or dyes: Although not a biologic family, may be considered together. Also not to be overlooked are drugs

Note that these foods *are* related: buckwheat and rhubarb; chocolate and cola; wheat and barley; mustard and cabbage; carrot and celery; peanut and bean; almond and peach; red pepper and tomato; shrimp and lobster; cow's milk and beef; cola drinks and cocoa.

Note that these foods *are not* related: pineapple and citrus fruits;

apple and peach; blueberry, blackberry, and gooseberry; wheat and buckwheat; beets and turnips; lettuce and cabbage; ginger and cinnamon; oyster and shrimp; peanut, walnut, hazelnut, coconut, cashew nut, Brazil nut, chestnut; tea and coffee; date and fig; raisin (grape) and prune (plum); white potato and sweet potato; black pepper and red pepper.

The physician working with food allergy problems must not condemn all nuts solely because one is at fault, nor should he be guilty of the same mistake with fruits, "acid" foods, greasy foods, starchy foods, meats, spices, seafood, etc.

DETECTION OF FOOD ALLERGENS

It must be understood that the accurate detection of food allergens depends almost entirely on clinical observation and that skin testing, so useful in inhalants, is of little real value in the field of food allergy.[2,3] It is only where inhalants are operative, as in asthma, nasal allergy, and certain cases of eczema that skin testing is really useful. The two steps in detection are (1) *history* and (2) *elimination diets*.

HISTORY

In history-taking, the physician is interested chiefly in two things —*first*, in identifying clinical manifestations likely to be of allergic origin; and *second*, in finding possible allergens. Both are of the greatest importance. By identifying all allergic traits, the physician not only gains confirmation of the allergic nature of the chief complaint, but makes possible the relief of a variety of secondary complaints. By finding clues as to possible allergens, he greatly facilitates food detection and shortens the patient's period of disability. A review of infant feeding problems is likely to be especially rewarding, as the child's first experience with such foods as milk, egg, citrus fruits, beans, and chocolate may have led to severe and clear-cut reactions. Prolonged colic, projectile vomiting, and recurrent diarrhea are commonly encountered in the feeding history of children found to be allergic to milk.[1]

ELIMINATION DIETS

The final establishment of the role of a food in allergy rests on a principle not much more involved than the folk saying, "the proof of the pudding is in the eating". Although a concerted effort to

develop more refined and scientific methods has long been made and still continues, the demonstration of (1) *clinical relief by elimination* and (2) *clinical relapse after return* remains the most effective means of identifying food allergens. Where one food stands out as a probable allergen (milk, egg, or chocolate for example) it is well to keep this food out of the diet for a month while other suspects are eliminated for weekly periods. If the child is entirely relieved by elimination of the prime suspects, further testing is, of course, unnecessary.

Care must be exercized that tested foods are completely eliminated. Although the child may later be found to have some tolerance, primary testing is best done with strict avoidance. Common food allergens and their sources are listed below.

SOURCES OF FOOD ALLERGENS

Milk: Milk, buttermilk, ice cream, sherbet, ices, cheese, custard; and such creamed foods as gravies, soups, potato dishes, and creamed vegetables.

Chocolate and Cola: Chocolate, cocoa; all drinks containing cola extracts.

Wheat: Breads, breaded foods, breakfast cereals, cream sauce, macaroni, spaghetti, noodles; flour, crackers, cookies, gravies, ice cream cones, pancakes, waffles, bran, pretzels, cake, doughnuts, some licorice candies, rye bread, corn bread, chili. Watch for flour in almost anything.

Corn: Corn meal, corn syrup, canned corn, corn on cob, popcorn and Crackerjacks, hominy, beer, grits, Fritos, corn cereals, tamales, tortillas. Watch for corn syrup in candies, cookies, canned fruit, chewing gum, wieners, etc.

Egg: Meringue, custard, meat loaf, French toast, mayonnaise, frostings, icings, salad dressings (some), noodles (some), ice cream (some; usually more expensive brands), candies (some), croquettes, breaded meats, baking powder.

Legumes: All types of beans, chili, peanuts and peanut butter, and candies made with peanut butter, peas, bean sprouts in Chinese dishes, soybean milks and soybean flour.

Potato Family: Tomato is found in many such dishes as chili, sauces, salads, salad dressings, catsup, pork and beans. Watch for potato in soups, stews, potato bread and as potato chips and sticks.

FOOD AVOIDANCE

The only known treatment for food allergy which is effective is avoidance.[2] It is, therefore, important that the patient know exactly which foods he can eat and those which he must avoid. In some cases there is more or less tolerance to food allergens, and avoidance in such cases may not need to be total. However, this is not commonly the case, and even where there is some tolerance, it is often lost with the passage of time. In some cases where sensitivity is not total, the patient finds that tolerance is lost in cold weather, during respiratory and intestinal infections, and during seasons when mold or pollen counts are high.

SUMMARY

Food allergy is a common source of a wide variety of obscure childhood complaints. Elimination of offending foods depends on accurate detection of offending allergens. Relief of the distress caused by food allergy depends on careful avoidance of foods found to be responsible.

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2601 Parallel Avenue

Clinical Conference

"OUTSIDE" STAPHYLOCOCCI INFECTIONS

THE ROOSEVELT HOSPITAL, NEW YORK

May 21, 1958

Edmund N. Joyner III, M.D., Chief of Pediatrics, presiding.

Heinz F. Eichenwald, M.D., Associate Professor of Pediatrics, Cornell University Medical College, Guest.

DR. JOYNER: Today we are going to present one case of pneumonia caused by "outside" Staphylococcus.

This is a case of the old fashioned Staphylococcus which just keels over and dies when we "blow on it"—we hoped, at least all the tests showed it does.

After that we're peculiarly fortunate in having Dr. Eichenwald, Associate Professor of Pediatrics at Cornell University Medical College who has been devoting a tremendous amount of his time to the staphylococcal problem, and who will discuss this case briefly, and in general the broad problem of Staphylococcus infections. May we have the first case presentation.

RESIDENT: This is the case of a 16-month old colored male admitted to the Ward Service on May 6, 1958 with fever, cough and increasing respiratory difficulty of four days' duration. Two weeks prior to admission, the child had measles. On admission, physical examination revealed a child in acute respiratory distress with marked flaring of the alae nasae. Temperature was 105 degrees F., respirations were 60 and pulse 120. There was dullness over the entire left chest posteriorly and rales were audible bilaterally, anteriorly and posteriorly. The clinical impression was pneumonia, post-measles. This was substantiated by the x-ray picture of pneumonia involving both lobes of the left lung. The child was initially placed on penicillin to which streptomycin and albamycin were added.

However, the child's condition remained critical. The initial white count, which was 15,500 with a shift to the left, rose to 29,900 with an increasing shift. In the second week the previously-men-

tioned antibiotics were discontinued and chloromycetin was started. Nose and throat cultures showed the presence of a hemolytic staphylococcus aureus. Blood cultures were negative. On the eighth hospital day, a diagnostic thoracic tap was done. Only a very small amount of fluid was obtained and it was a sterile culture. Chloromycetin therapy was continued for four weeks. Repeated x-ray examinations showed several areas of loculated collections in the left pleura which gradually disappeared.

The child was discharged on the forty-fifth hospital day.

DR. JOYNER: Thank you. I don't want to spend too much time on this case. From the bacteriology which we obtained and which would fit in with the clinical and x-ray findings, I think one can reasonably be assured that the child had a staphylococcal pneumonia with so-called "outside" staph, that is, a on-hospital staph, and that this child has done well.

It does illustrate one important thing, and that is in staphylococcal pneumonia as against pneumococcal pneumonia, quite frequently with or without antibiotic, you'll not get the temperature down by crisis. It's a slow, gradual drop, and Dr. Eichenwald and I were talking about this coming over here, and discussing how frequently in these days and times, if one doesn't get a dramatic result in 24, 36, 48 hours, then one tends to switch antibiotics or combinations of antibiotics.

This child was tapped once, at this stage primarily a diagnostic tap to see what we were really dealing with, and it was a sterile culture. He is doing well now. There is still some supression of breath sounds in this area (indicating) and some dullness. So, we will watch that, but I rather doubt that there's very much fluid there.

DR. JOYNER: Now, with this I think we'll ask Dr. Eichenwald to take over and help us out on this important problem.

DR. EICHENWALD: Thank you, Dr. Joyner. I think this case represents staphylococcal disease for several reasons.

In the first place it shows the form of the disease that we used to be most familiar with, namely, a child who has some other type of infection, usually a viral infection of the respiratory tract, and then develops a staphylococcal infection, and complications.

This child had the measles, which made him more susceptible to invasion by otherwise benign Staphylococci, and this went on to pneumonia. I would guess if he had not had the measles, he would not have gotten pneumonia. This is the way that the Staphylococcus

really used to act generally—it came as a secondary invader. Then, in the past few years, beginning probably first in Canada and subsequently in Western United States, and then spotted throughout other parts of the United States, there have been many very disturbing reports of staphylococcal epidemics not only just impetigo, but actually epidemics of pneumonia and empyema with a fairly high mortality rate.

A thought that comes to mind is: why did this happen and did this happen before? And is this something new? Unfortunately this is a question that we can't answer.

Impetigo neonatorum, impetigo contagiosa, whatever you want to call it, has been with us for a long time and naturally epidemics of this have been known to occur, certainly ever since nurseries were started. It used to be that if you closed the nursery, and painted the place, and aired it out, you could start over again, and you would not have another epidemic.

Times have changed. Now, you can do everything short of burning the building down, and whenever you introduce new infants into the environment, trouble will again start. Why is all this true? Well, I think it probably is due to the fact that somehow, probably by chance, the Staphylococcus mutation, or probably a series of mutations, occurred and the Staphylococcus acquired a certain set of properties. This changed Staphylococcus is identifiable by typing methods—a method of phage typing which I think you know about. It is a very complex method, in no way as satisfactory as serological typing, but Staphylococcus cannot be typed by serologic methods at the present time. I think everyone would agree that phage typing is a very crude method, but it has helped a lot in delineating some of the peculiar varieties of this organism.

It was found very soon once the phage typing was applied to this problem—and this is only in the last five years—that almost all the highly virulent varieties were due to a phage type, which at the time was known as 52-42B, 80-81 and because of some technical advances, this is now simply classified as an 80-81. It's easier to remember.

This organism has, aside from its phage pattern, no biologic properties which permit it to be identified. It has, however, certain epidemiologic properties. In the first place, unlike most Staphylococci, this organism spreads with tremendous rapidity. It takes a very few bacteria to initiate an infection. Normally, with a Staphylococcus of low valence, one has to be quite heavily exposed in order to have an infection initiated, and as you know, without infection,

there can be no disease. Now, with the 80-81, there are very few organisms required to initiate an infection. As you know, no one has as yet demonstrated any humeral or tissue immunity to the Staphylococcus, nor does repeated infection with Staphylococci lead to any detectable or clinically demonstrable type of immunity

Therefore, an organism of this type, to which there are none naturally resistant nor immune individuals, can spread with great speed through the population. Actually what one has is the introduction of a potentially pathogenic organism into a virgin population. This is, indeed, what happened.

Possibly because this organism so often caused disease, it was frequently exposed to antibiotics, and it may be for this reason that the 80-81 showed another one of its common properties which is a high degree of resistance to all the commonly employed antibiotics. The speed with which this particular Staphylococcus acquires resistance to antibiotics is really no different from the speed with which other Staphylococci acquire resistance, but since it causes disease, more so than any other Staphylococci, you can see why this organism would be subjected to a barrage of antibiotics of all types and, therefore, would have the opportunity to become resistant much more rapidly.

Now, despite many statements to the contrary, there are strains of the 80-81 which are susceptible to all antibiotics, and as I mentioned to Dr. Joyner just recently (last week in fact), one strain was sensitive even to penicillin in very low concentrations. So, the 80-81 does not necessarily imply drug fastness although most strains of this organism are. The disease causing potential of this organism is due perhaps to another one of its peculiar properties.

I might mention that normally Staphylococci that one acquires are constantly being changed. You are continuously putting out Staphylococci and taking in Staphylococci, and under the average situation, which is normal healthy life, the Staphylococci in the nasopharynx may change from one phage type to another. It's a very slow change but in the space of a year you'd probably go through three or four different changes of Staphylococci.

Not so, with the 80-81. It is a more perfect parasite, if one can use this expression. The 80-81, once it parasiticized (or the expression that is used is colonized) an individual's nasopharynx, it tends to persist for extremely long periods of time. It often does not cause disease unless it is somehow stimulated, and this stimulation may be a respiratory infection of a viral nature, or perhaps a cut in the

skin, or in infants, of course, a circumcision, or the open umiblical wound, or the fact that the infant's skin frequently has minute perforations on it from the over-anxious cleansing to which the infant is subjected. So what happens?

Well, a baby acquires an 80-81 in the nursery, and this happens to be a strain which is more respiratory tract tropic than skin. Nothing may happen. The child may go home, and be perfectly well. Perhaps another member of the family acquires a cold, six, seven, or eight weeks later, and this family member (maybe the mother) communicates the cold to the infant. The infant will have a regular cold, will not appear particularly ill, but then, suddenly, usually on the second or third day, will become extremely ill; the organism will somehow have managed to penetrate through whatever the barrier is between the nasopharynx and the lungs, and the child usually will have a widespread pneumonia with or without empyema, and these can be so rapid that from the time of onset to the time of death may be as short as 8 or 10 hours.

This is one thing that can happen, and of course in a case like this one rarely connects this with the original event in the nursery namely, the fact that there happens to be an 80-81 around which the infant acquired during his stay. Another thing may happen that is more obvious, and has attracted, initially, most of the attention—the infant is in a nursery and he happens to acquire an 80-81 which likes skin. This infant may get impetigo. Of course, impetigo is a classical nursery infection. Everyone is very familiar with it, particularly if there are five or six cases around the nursery, everyone assumes that the nursery is contaminated, but you can see why with an organism which causes pneumonia six, eight, nine, ten or even more weeks after discharge from the hospital, there frequently is a great reluctance on the part of the physician or the Health Department to attribute this to the infant's stay in the hospital.

Another thing which suggests to obstetricians and pediatricians, that this may be a hospital infection is the fact that the incidence of breast abscesses begins to increase very rapidly whenever 80-81 gets into the area. This is due to a quite recent interesting demonstration.

I think it used to be thought, and some books stated, that breast abscesses are dangerous to the child because the mother might transmit an infection to the infant. At the present time we know it's usually the other way around. The mother has the breast abscess because the infant has transmitted the infection to her.

Now, let's reconstruct this. Again, what happens? The infant in

the nursery acquires . . . is colonized with the 80-81. He is then breast fed and a number of demonstrations have proved quite conclusively that the 80-81 is injected during the process of feeding into the breast, and if conditions are right (and no one knows what these conditions are) the mother will develop the breast abscess, and these breast abscesses are usually multiple. So, we have here the situation where the infant is perfectly well, but is colonized with the 80-81 and gives it to the mother who becomes sick.

Whenever there is an increased incidence of breast abscesses in the mothers, one can say with certainty and one is always right (at least we have been every time) in making this prediction, that if you culture the infants you will find that most of them, if not all of them have an 80-81 in their nasopharynx.

Thus, 80-81 infection can be quite silent. It can remain silent for long periods of time. Some infants apparently can carry the 80-81 for a year without any disease and eventually will lose it. On the other hand, they can also pass it to their mothers. I saw a family today—it was rather interesting—which happened to consist of four children, a maid, and two parents; the infant developed impetigo in the hospital and was treated, but not sufficiently before going home, and treatment was discontinued somewhat early. The mother developed a breast abscess shortly after she left the hospital. This was treated. In the meanwhile, the baby was taken care of by a maid. The baby looked fine at this time. The maid developed lymphangitis, and a cellulitis of one of her hands, while the mother, in the meanwhile developed another breast abscess.

The baby was not being treated because he seemed well. The mother was treated for a breast abscess, and developed another breast abscess about three weeks later; at about this point, the father also developed a small furuncule, which spread rather rapidly in an area which made it very hard for him to sit down. And the father was treated. The maid, who had been treated, developed something else and then a conjunctivitis which may have been staphylococcal in origin, and finally one of the other children also developed furunculosis.

What we have here is really the epidemic spread of Staphylococcus, not in a nursery but in a family, a close family, close in that everyone plays with everyone else—everyone has their own bedroom, but they spend a good deal of time together. Evidently, what happened is that the infant brought the infection home, infected everybody, and people came down at various intervals with a disease.

The only way this can now be stopped is by treating the whole family (even those not sick or those who were sick a while ago) because they're all carriers. If you treat just the one who is sick, that one will be reinfected as soon as he is off treatment by the others in the family, who are not sick at that particular point. They will probably get sick at some other time.

So, the 80-81 is a problem not only in the hospital and with people who are in the hospital but also their contacts. We have now had two families where an infant went home apparently well, and a case of staphylococcal pneumonia developed within a month in one of the infant's siblings.

There is another problem one must consider—the final problem from the clinical standpoint—the staff.

So far we have had eight nurses and two pediatricians develop staphylococcal infections. Each one of these individuals handled newborn infants. And so, they too are not immune.

Now I would like to say a few words about treatment.

It is not possible in any individual to predict with certainty which antibiotic would be most effective on the basis of experience. I think it is important in every case, even when they all seem to come from the same nursery, to do antibiotic sensitivity tests. But the problem here is in the interpretation. I think we all have a great tendency to believe the written word, and the laboratory tends to be the written word and one tends to rely on what the man says, or what the sensitivity tests show. Actually, sensitivity tests never show anything! They are basically just interpreted as showing something, and the problem of interpretation is a very great one.

One cannot really compare (either by the tube dilution method, which is very elegant but very expensive and time-consuming for testing antimicrobial susceptability of organisms or by the disc method, which is more commonly employed), one antibiotic with another except in regard to two things: sensitive or resistant.

Degrees of sensitivity mean nothing. This is due to the fact that antibiotics have different activity range depending on the pH. At a standard pH which is usually employed in the tube dilution tests, some antibiotics may be more active than others.

This is not what takes place in the body, as you know pHs in the body and in the blood are pretty uniform, but in pus, pHs can go down quite sharply.

In addition, in the disc method, one of the great problems is that of diffusion. Some antibiotics in clinical use diffuse extremely rapidly; other antibiotics diffuse extremely poorly, and therefore,

the zone of inhibition one gets around the disc is smaller if the drug diffuses poorly; it is large if the drug diffuses well.

So we have made it a policy to report on the basis of disc methods, only resistant vs. sensitive, and not highly sensitive, moderately sensitive, or anything like that, because this depends on the diffusion, and also upon such things as how heavily the plate is streaked in that particular area.

Then, one has to watch several other things. One is that most Staphylococci are sensitive by the disc method, and in many cases by the tube dilution method to chloramphenicol, but bitter clinical experience has taught most pediatricians—and I don't think the internists and the surgeons have been well convinced of this yet—that chloramphenicol, despite its demonstrable superiority in the test tube, is a miserable staphylococcal drug. The internists, I think, don't see this as clearly as we do because they deal with people who have a great deal of natural resistance, and dissemination of staphylococcal infection doesn't tend to be as rapid as it is in an infant.

If you have a really sick infant and you treat him with chloramphenicol, you will notice that nothing happens. The infant continues to get sicker; the cultures generally continue to be positive; of course there are exceptions.

For that reason, we do not, in our Department of Pediatrics, use chloramphenicol for staphylococcal infections, no matter what the sensitivity tests show, unless we have used dilution methods and this indicates a very, very high degree of susceptibility, which just doesn't happen any more.

Then some of the other drugs, particularly the newer ones, like novobiocin, oleandomycin, (which is a very poor antibiotic, although the newer version of it, triacetyloleandomycin, is considerably better) and erythromycin, have a disadvantage in that their action is rather slow.

If you have three or four days in which to treat a child before he dies, this may be adequate, but if an immediate and quick action is required, these drugs are rather disappointing.

I think this is chiefly due to the fact that these drugs, the advertising to the contrary, are only mildly bacteriostatic. They are not bactericidal except in very high concentrations and then only in the test tube.

It is for this reason that we have used the bacitracin, a bactericidal drug, which I think has been discussed with you before.

Another rule of thumb we have followed—based admittedly on experimental evidence—is that every patient with a staphylococcal

infection, severe enough to require hospitalization, receives penicillin, and usually in very high concentrations. In animals, the evidence for this is that if you take the only model we really have, a mouse, and treat this mouse with penicillin after infecting it with a lethal amount of Staphylococci, which are however resistant to penicillin, the mouse for some reason which we don't understand survives, while the untreated one dies.

Now, one can use Staphylococci that are as resistant as 500 units of penicillin per cc. The mouse will survive. Why? We don't know. It's probably that the penicillin is just enough to balance out the natural bactericidal effect of the host or what.

I've covered as much of the ground as I thought I would. Now perhaps it would be best if you ask me specific questions.

DR. JOYNER: I open the floor to questions.

QUERY: You can only use bacitracin roughly for about five days. You are not going to clear a staphylococcal pneumonia in five days; do you think after five days, bacitracin is so effective that penicillin will carry on from there? Or, what is the rational of saying five days, and that's it, and then you can take up with the others?

DR. EICHENWALD: The trouble with bacitracin, of course, is you run into toxicity, renal toxicity. We started to use bacitracin—the first series was treated in 1955; "novobiocin" wasn't available then. We used it only in children whose Staphylococci were completely resistant to all known antibiotics, except bacitracin, and we did some work on dogs to define the dosage of this material. The way these children were treated was by giving them bacitracin and penicillin for five to seven days, and then continuing with the next best antibiotic, which was determined on the basis of susceptibility tests, which in these patients at that time was erythromycin.

Now, we have still not used bacitracin except in infants where we were certain they would die unless it was used. All infants we have treated, eighteen, have been treated only because all the other drugs failed in the acute phase of the disease, and all these drugs included everything known to man!

Some of them were given several antibiotics simultaneously for periods—in some cases as long as five or six days—and they kept running steadily downhill. Then the bacitracin was given, and it wipes out in a very short period of time all circulating Staphylococci. It's remarkably effective in that regard.

We have then treated the infants for as long as four to six weeks

with the novobiocin depending on whether the disease was osteomyelitis, which we don't treat as long as empyema; sepsis we treat the shortest of all. We have one sepsis that was treated only with bacitracin, and only for five days and that was the end of it.

I was telling Dr. Joyner about one interesting case we had, a child who received antibiotics for four days, previously had a sepsis, a positive blood culture and every time we took a blood culture, Staph. aureus showed up as many as 1,000 organisms per cubic millimeter of blood, and this child was rapidly running downhill. It was one of the first we treated at the New York Hospital. We felt there was nothing to lose and the child was placed on bacitracin. The child had one injection of intramuscular bacitracin. We took a blood culture three hours later and it was negative. It was never positive again. If it's given to selected patients, the ones where other agents have failed, I think it's a wonderful drug. We haven't evaluated its toxicity really enough to know at what point in the less severe disease one should consider using bacitracin. We have used it in the ones only where we felt the infants would die, and the results have really been astounding. Seventeen out of eighteen have survived.

QUERY: Let's talk about huge doses of penicillin. Everyone says "huge dose". What do you mean by "huge". Years ago you could get by with 100,000. Take a four-month-old baby weighing 15 pounds. . . . do you mean two, three or four million a day? I mean this can go on . . . just what do you mean by "enough" penicillin in this present-day concept?

DR. EICHENWALD: Enough penicillin is probably 250,000 units per kilo. When you get up to two million, I think you can just keep it at two million. This is for an infant.

I don't think it does much good to increase it and this is aqueous penicillin G, because we're trying to get maximal levels. We usually give that four times a day. This is a huge dose, but this requires huge doses. Most of the penicillin is given in that dosage only for as long as bacitracin is given. After that time we cut the penicillin down. You can't continue that type of injection in an infant indefinitely anyway. Bacitracin usually is quite irritating, and with the combination of the two, the infant won't have any place to sit when he grows up. (laughter)

DR. JOYNER: How about the intravenous use of penicillin? With most babies, if it is given intermittently, is that all right?

DR. EICHENWALD: It works just as well if given intermittently, not continuously, 24 hours.

DR. JOYNER: At 24 hours, every 10 or 15 minutes?

DR. EICHENWALD: If you get a high level that way. I think it's the height of the level, not the intermittency that is important; if you drip it your level isn't very great anyway because after all the kidneys start excreting it at about the rate you're putting it in, and you get one level and you stay there for a long period of time.

QUERY: Do you use novocain with your bacitracin?

DR. EICHENWALD: No, we do not; it hurts but the infants seem to tolerate it quite well.

QUERY: Is there a contra-indication to using procaine with bacitracin?

DR. EICHENWALD: I don't believe there is. Actually, I don't know. I'd better reverse that. Bacitracin is a very unstable drug. It's probably the most unstable antibiotic. It is so unstable, and this is a practical point to remember, that one has to use a fresh ampule each day. It's best to throw the rest away. Even under refrigeration the deterioration in forty-eight hours is considerable, and I'm not sure if you mixed it with procaine, you might not hit a wrong pH or something. I don't know. This would have to be tried beforehand.

QUERY: Do you consider chloramphenicol bactericidal?

DR. EICHENWALD: No.

QUERY: How about nitrofurantoin?

DR. EICHENWALD: No, I don't think they have any particular value in the treatment of staphylococcal infections. I know they've been used in very desperate situations but I think there are other drugs one can use in desperate situations which are more effective.

QUERY: Have you any figures as to the incidence of breast abcesses in mothers who nurse their children and those who do not nurse their children? My impression is that in days gone by when there was more nursing being done, we had more breast abscesses than we're getting now. How does that fit into your theory of transmission?

DR. EICHENWALD: I think this is perfectly right. With 80-81 in

the picture of course, the organism can also go through fissure nipples, and any other organism can too. At the present time at the New York Hospital we have not had a single mother that I know of, who developed breast abscesses with a Staphylococcus, who did not breast-feed her baby; this may be due to the fact that we have an unusually high incidence of breast abscesses—we had it until we were able to get rid of the 80-81.

QUERY: Do you think it's a new strain?

DR. EICHENWALD: I don't know. Actually the ratio that's given with the 80-81 is about 15:1, you get fifteen nursing mothers who will develop breast abscesses to every one that's not nursing. Of course, the mothers are also exposed to the infants whether they breast feed them or not, and the breast if it lactates only a few drops of colostrum can be invaded. It's an opening which the organisms get into, but it's more likely the infant injects the Staphylococci while it's feeding and this is why I think this ratio is so. But until the 80-81 came along, I think what you said was perfectly true.

DR. JOYNER: Dr. Eichenwald, at the New York Hospital, do you know whether the infections in the surgical department, operating room, and so on, which I know have increased in all hospitals, have been primarily the 80-81?

DR. EICHENWALD: Many of the serious infections have been, yes; but they also have others which are not the 80-81 but a number of different strains. The 80-81 was only recently introduced to the hospital, and following its introduction there was a rise in surgical morbidity and also in puerperal morbidity and this indicates the two events were related in one way or another. Since then, they have been recovering 80-81 from quite a few of their wounds; in spite of that they found miscellaneous Staphylococci of various types.

It may be that living in the decade of the Staphylococcus, that the 80-81 is the prime culprit in pediatrics, which it seems to be because there are very few nursery epidemics, only one or two where the 80-81 was not responsible. But it may be that all the Staphylococci are gradually becoming more invasive. Eventually, these others may begin to play a role in the nurseries also.

QUERY: How do you know 80-81?

DR. EICHENWALD: We can almost tell by the malignancy of the condition.

DR. JOYNER: Do you know, whether in order to evaluate, help us evaluate nose and throat cultures taken from the children during winter in this country, what percentage of individuals would have Staphylococci and Staph. positive in their nose and throat in a normal environment?

DR. EICHENWALD: A level of about 80%, that is, if you consider one or two cultures. If one uses some of the selective media which block out all the other bacteria, one will come out close to 100%.

QUERY: You said something of interest to me. How do you account for the fact that there are some people always getting staph infections and others exposed to the same surroundings, say in a boy's camp, or in close rather dirty surroundings, who never get a staph infection?

DR. EICHENWALD: I think I said there's no demonstrable natural immunity. This is a common observation. There must be something, maybe it's the oil on our skin, the natural oil, which protects some people better than it protects others. While some people continuously get staph infections; others never do, or rarely. I've worked with the bug, well, ever since it came to the New York Hospital, I've sat in it and I've never had any trouble. I have practically gargled with it. Yet some casual passers-by get into difficulty very rapidly.

QUERY: Where does this bug get its number from?

DR. EICHENWALD: 80-81? Well, those who initially worked with it, successively gave it different numbers, 1, 2, 3, 4, 5, 6, 7 and each Staphylococcus usually has a pattern. It doesn't, if you take a whole Staphylococcus, it usually has several. This is why it used to be known as 52-42B and 80-81, which are usually identical. The 80-81 happen to be the numbers reached for this particular bug.

QUERY: Does the coagulase positive and negative mean anything?

DR. EICHENWALD: No, we haven't got an 80-81 which was negative, but there are coagulase negatives Staphylococci which cause trouble. Even at best it's a hard test to do in a standard fashion. It's only very recent that standardized plasma has become available. And before that, one laboratory would get a Staphylococcus as being positive, another one would report it as negative. The same thing is true for hemolysis. They pay attention to whether the bug is hemolytic or nonhemolytic.

If you wait long enough, most Staphylococci aureus are hemolytic. We have to store them in the refrigerator and wait, but it's a matter of degree—and we don't pay any attention whether it's hemolytic or non hemolytic. We do coagulase tests only for screening typing methods.

And this is another problem. From a technical standpoint, many laboratories, using the regular blood agar for the identification of Staphylococcus, report a given Staphylococcus as an albus which it actually is not. And if your clinical judgment tells you that this patient has an aureus Staphylococcus infection, a severe staph, infection, and you get back an albus report, it's probably a very pale aureus and one needs special media to make it really come out yellow. As a matter of fact, it's true that some of the most malignant staphs which we have seen have been almost white, ivory color, and any bacteriologist would call them Staph. albus, but when you put them under the special media which are used, they turn this rich golden color, so one has to look at the lab. reports with some clinical understanding. The Staph. albus to aureus is really a range of colors.

QUERY: When you treat old carriers of 80-81, what do you prefer to use novobiocin?

DR. EICHENWALD: Well, in adults we try to avoid it. For 80-81 in children novobiocin is a wonderful drug. Thas is one of the unique things about it. We've treated close to 600 infants with it, with only five or six cases of diarrhea, no rash, no yellow color or anything else.

When we give it to adults, we start getting into trouble. About 10% of adults develop a rash that looks something like german measles. Another 10% get diarrhea. About 2% turn a bright yellow, somewhat like this sheet of paper. This is not due to any liver problem; it's due to the breakdown, (one of the breakdown products of novobiocin happens to be a yellow-colored dye) and people turn normal color very quickly after you stop the drug, but it's quite upsetting to the patient if he looks up one morning and sees what looks like a buttercup staring at him in the mirror! The incidence is so high that we estimate in the adults that we see, about one out of four will have a reaction to novobiocin. We treat them only if we feel it is essential to do so.

If the bug shows any sensitivity to erythromycin at all, we try that, and we give it for as long as three weeks. This is usually enough to eradicate it, and if that doesn't work, or if the bug is com-

pletely resistant to erythromycin and if we have a nurse who is a "carrier," we have her do paper work for two weeks, take her out of the environment where she had acquired the 80-81. It's surprising what a high proportion of these people will lose the 80-81 if they're exposed massively to other Staphylococci. We bring them to another part of the hospital where the 80-81 does not exist and where they don't have any patient contact.

In a hospital situation 80-81 competes with other Staphylococci, which cause much less disease and we're happy to settle for one other than the 80-81. It's sort of taking the lesser of two evils.

QUERY: Would you advise against bringing a newborn into the nursery which has some?

DR. EICHENWALD: No, I think if you're afraid that the nursery is contaminated, and I think you have to have good indication for this fear, I would suggest you put the baby from the moment it is born to the day it goes home on novobiocin and this will prevent colonization. Then the baby can breast-feed.

QUERY: What dosage?

DR. EICHENWALD: We're using 25 mgs. per kilo. It's inexpensive because the baby weighing maybe 3 kilos uses so little of it. You've probably read in the papers lately a lot about phisohex; in an epidemic situation of a really good hot 80-81, it does almost nothing.

QUERY: How do you give the novobiocin, three times a day or four times a day?

DR. EICHENWALD: Three or four times, it doesn't appear to be essential; if possible four times, if not, and the nursing isn't adequate, three times.

QUERY: Suppose you get a child who is desperately ill as far as pneumonia is concerned, perhaps not going to die, but you can't be sure it's not going to die very quickly, how would you treat that?

DR. EICHENWALD: With a history of measles and then pneumonia?

QUERY: With a history of measles and then this kind of pneumonia, you very rapidly go out from staph?

DR. EICHENWALD: We probably would use bacitracin. We try not to use it on every single case. The rule we have at Cornell is that only the professor or I can decide who gets bacitracin. And

we try to look at each child. I think as we get more experience with the drug, it will perhaps be more widely used, but I'm afraid of it still, in spite of the fact we've done fairly detailed kidney studies on all these kids and we've been impressed with the fact it is toxic but the toxicity is reversible. But, I don't know. I still worry each time we give it.

QUERY: You see a lot of casts in the urine.

DR. EICHENWALD: That's right.

QUERY: Have you had any experience with spontin?

DR. EICHENWALD: Yes, I mentioned to Dr. Joyner, there are difficulties with this: one, of course, is its i.v. administration.

Now, we've had one total failure. The laboratory indicated the Staphylococcus should be sensitive but it was clinically resistant.

We've also used vancomycin which is another i.v. antibiotic. We've been very dissatisfied with that one. It seems to be very weak.

In the last five years, every antibiotic which has come out against the Staphylococcus has been one step weaker than the previous one. Novobiocin isn't as good as erythromycin, but the bug is now resistant to erythromycin; and oleandomycin isn't nearly as good as novobiocin, and spontin probably won't be as good; and the vancomycin isn't as good as the oleandomycin. We keep going downhill.

But now, one gets to the point where one wonders whether distilled water is what one should use! I don't thing the future is very bright; as far as I know at the present time, none of the big pharmaceutical houses has anything in the offing which is going to be effective.

SURGEON: How about a surgical resident that has 80-81 in the nose and throat—would bacitracin in the nose and throat help at all?

DR. EICHENWALD: I don't know. I've never had any experience with it. I would think it would be worth the two week course on novobiocin and you usually lose the bug fairly quickly after the initiation of therapy and could probably go back to the operating room after four or five days, and then after the drug is discontinued, if you can tolerate it for two weeks, the chances are you'll be negative.

QUERY: Of course, your Chief Surgeon isn't immune either

because we had a recent panel of the American Academy of Pediatrics on Staph.—you might have been there—and one of the surgeons at the New York Hospital had spent periods of weeks culturing all persons in the operating room. What is your policy now in those who are carriers?

DR. EICHENWALD: They're not supposed to operate.

QUERY: In our hospital we do not have phage typing methods available, and really we don't know what kind of staph we're dealing with at times—whether it's just common garden variety or not and even if it is, I think we ought to be able to know what the phage type is.

DR. EICHENWALD: The City would be overjoyed to do it for you.

QUERY: We're doing it here now through the clinic.

DR. EICHENWALD: The City does it and they're adequate—they won't get too technical but they'll do an adequate type of job. If you want to write a paper and you really want to be certain that the type you have is what you think you have, you can send it to the Public Health Service, which does really superb typing. But the City Health Department is really adequate. I mean this is one of the fastest things they can do. They'll let you know in a couple of days.

QUERY: If it's an 80-81?

DR. EICHENWALD: Actually, that's all you're really interested in. If it's something else, they'll take a little bit longer.

DR. JOYNER: Any other questions? If not, I want to thank Dr. Eichenwald on behalf of all of you. It's been a great help. (applause)

PARATHION POISONING
(Phosphorus Compound)

A Report on 22 Children in an Outbreak
A. Wishahi, M.D. (Cairo)*
Y. W. Aboul-Dahab, M.R.C.P. (London)*
Y. Sherif, F.R.C.P. (Edinburgh)**
and
Z. El-Darawy, Ph.D. (London)**

Cairo, Egypt

*Drs. Wishahi and Aboul-Dahab are associated with the Pediatric Department, and **Drs. Sherif and El-Darawy are associated with the Forensic Medicine Department of Abbassieh Faculty of Medicine, Cairo.

Parathion (P. Nitrophenyl Diethyl Thionophosphate) is an insecticide containing phosphorus generally intended for the preservation of plants in their growing stages against certain pests in Egypt; as a fumigating dust it is used to combat the cotton plant worm. No cases of poisoning in children have as yet been described in this country. Reviewing the literature, we were able to find only one report of two children poisoned by this insecticide, described by Chamberlin and Cook in the United States in 1953[1]. The present outbreak, which occurred February 4, 1958, was due to accidental contamination of flour during its storage at a special bakery in Cairo. It involved about 200, both adults and children. Herein, it is intended to describe the clinical features of this poisoning in children and discuss its differential diagnosis, pharmacology, toxicology, laboratory diagnosis and treatment.

CLINICAL SURVEY OF THE CASES

There were 22 cases admitted to the Children's Hospital, Abbassieh Faculty of Medicine, apart from adult cases admitted to the Medical Department of the same Faculty. Three other hospitals in Cairo received the remaining cases, both adults and children. All fatalities occurred in children. This communication is concerned only with the aforementioned 22 cases.

FATAL CASES

There were five boys and three girls, aged 3-10 years (average 6 years). The symptoms appeared from 15-60 minutes (average 28 minutes) after ingestion of the bread. The initial symptoms

were abdominal pain in five, accompanied by vomiting in three, in none of whom it was persistent. Convulsions heralded the clinical picture in three; there were generalised clonic convulsions in one, and in the form of twitches of the facial muscles (mostly the eyelids) in two. Giddiness or fainting were early symptoms in six cases.

Nervous symptoms rapidly followed the initial ones, and dominated the clinical picture. Six cases developed twitches of the facial muscles (fasciculations) and, of the upper limbs, culminating in clonic convulsions in two (all but two had convulsive movements at or shortly after the onset of the illness). All fatal cases lapsed into rapidly deepening coma which was accompanied by shock in six cases, and hypertension in two (blood pressure 150/100 in a six-year, and 120/80 in a three-year old child). Respiratory failure with or without shock was the direct cause of death in all, which occurred in from 4-9 hours (average 6 hours) after the onset of symptoms. Hyperpnoea was the earliest manifestation of respiratory failure, observed in three cases, whereas in advanced cases apneustic and finally gasping respiration were obvious.

This is the sequence of events observed in respiratory failure of brain-stem origin. The pupils were myotic and equal in three cases in one of which they were pin-points; in another two cases there was unilateral myosis; all abnormal pupils showed a slight or no reaction to changes in intensity of light. Excessive frothy saliva was a marked feature of seven cases, even before the development of coma. In two cases where the pharyngeal reflex was tested, it was absent; in such cases pharyngeal palsy aggravated the accumulation of saliva in the mouth. Coarse crepitations were heard in the chest of all comatose patients, obviously due to retained and/or inhaled secretions and to the development of pulmonary edema. The temperature varied from 35°-37°C.

As the case was not suspected of being phosphorus insecticide poisoning from the start the treatment was carried out on a symptomatic basis. Stomach wash was done with magnesium sulphate in the first six cases; this was later changed to potassium permanganate. Suction of secretions and postural drainage were practised in every case. Oxygen inhalation, in three cases by endotracheal tube with positive pressure, and artificial respiration was also done for all. Methedrine 10 mgm.-15 mgm. intravenously with 25 per cent glucose, and other analeptics were given to cases showing shock. Rectal paraldehyde was used in one case to control the convulsions. Cases in coma received vitamin B_6. As soon

as good grounds for suspecting the nature of the poison as being a phosphoric acid ester were gained, full atropinization to the point of full mydriasis was carried out, together with alkalies (sodium bicarbonate) by the stomach.

Cases that survived: There were 14 cases, one of which was very mild and which was discharged the day following admission. Of the remaining cases, one was severe, four moderate, and eight mild. Their ages ranged from 2.5 years-13 years (average 6.7 years). The symptoms appeared 15 minutes-90 minutes after ingestion of bread, with an average of 46 minutes. Some children complained of a sour or phenolic taste in the bread. Giddiness, one of the most prominent initial symptoms, was accompanied by pallor, and in some cases by sweating and fainting. Some abdominal complaint was always present as an early symptom. Abdominal pain and vomiting were the most common ones, and the latter, of some severity in three cases, persisted for two to three days.

Excessive salivation was an early feature in most cases. Tremulousness ushered in the onset in two cases, but clonic convulsions of the upper limbs occurred only in the one severe case that survived, a girl of 13, and were followed by coma which lasted for 14 hours. Her blood pressure which was initially 190/120 rapidly responded to amyl nitrite inhalation. After the early stormy phase which was similar to that of the fatal cases, she rapidly improved, being left with residual nervous and gastro-intestinal symptoms in common with the rest of the cases, and was ultimately discharged cured on February 19, 1958. Hyperpnoea occurred in the first day in two moderate cases, in one of which (aged 4 years) it was accompanied by shock, with a pulse rate of 180, and blood pressure of 80/60. In contrast, hypertension (blood pressure 120/80 to 140/100) was present in the first day in six other cases, but subsided to normal figures during the next day. Lumbar puncture, done in two hypertensive cases, showed the cerebrospinal fluid to be under normal tension.

The initial acute symptoms abated in a few hours after admission in the mild cases, and in one to two days in the others except in two cases where they persisted for 3 days. Examination of the nervous system after subsidence of the acute phase disclosed disturbances of equilibrium in seven cases, leading to a staggering gait in four cases, and to inability to walk on a straight line and/or to maintain equilibrium on one foot in three cases (aged 11, two aged 8 years). All seven cases had nystagmus on lateral deviation

of the eyes. Two cases showed adiadochokinesia; and in one there was sagging down at the wrists, the hands outstretched (due to hypotonia). Such symptoms are probably due to a combination of general muscular weakness and the effect of the poison on the cerebellum. Marked irritability, hallucinations and apprehension persisted for 3.5 days in one, and drowsiness, marked apathy and/or headache in three cases for two to three days, all of moderate severity.

Two children complained of numbness in the hands. In the mild cases headaches, apathy, drowsiness and mild confusion or irritability were more transient features. No changes could be detected in the optic fundi, and no reflex or sensory changes were found. Residual gastro-intestinal symptoms were common and consisted of anorexia, nausea and abdominal pain, and less commonly vomiting and diarrhea. There was no dehydration in any case.

Two cases complained of frequency of micturition. No abnormalities were detected in the urine; the blood picture was within normal limits in all. On discharge, five days after the accident, all symptoms including the nervous had completely disappeared except for some general muscular weakness and slight incoordination of movements in two cases. The lines of treatment were similar to those followed in the fatal cases. Subcutaneous infusions were administered to the cases that had persistent vomiting. Sedatives and antibiotics (mostly penicillin procaine) were often used, the latter to control respiratory infections. Cases with severe hypertension were given amyl nitrite by inhalation; this was rarely repeated. It had a definite, though very brief effect in lowering the blood pressure.

DIFFERENTIAL DIAGNOSIS

The epidemiology of the poisoning could not be known before midnight (some 15 hours after the onset). On the day of the poisoning, the story resolved itself into an outbreak associated with bread, with a predominance of nervous symptoms: twitches, convulsions and coma, together with parasympathetic stimulation, or alternatively, sympathetic inhibition, and blood pressure changes, all out of proportion to gastro-intestinal symptoms; and ultimately death from respiratory failure. With such a misleading coincidence as the association of bread with these symptoms a provisional diagnosis of "acute ergot poisoning" had to be considered at first. When it was ascertained that the origin of bread poisoning was

limited to one bakery, although flour was obtained from a common source by the whole of Cairo, this diagnosis became quite unlikely ad had to be revised. Lead poisoning was out of the question on clinical grounds, as well as temulin poisoning and lathyrism, and poisoning by the whitening agents of flour (hypochlorites).

The muscarine-like symptoms soon followed by those suggestive of a nicotine effect of acetylcholine directed attention to the possibility of "organic phosphorus insecticides." This was later confirmed on chemical and pharmacological basis in the laboratories*. Retrospectively, the main points of difference between organic phosphorus poisoning and acute ergot poisoning were the short interval between the intake of bread and the development of symptoms and the excessive salivation, together with the unimpressive tingling or other parasthesiae and the absence of thirst in the former. Finally, it will not be out of place to mention that ergotoxin and ergotamine have a partial anticholinesterase action,[2] in common with parathion.

POST-MORTEM EXAMINATION

Five cases were picked at random from the total dead. Cyanosis of the lips, conjunctiva and face were cardinal features. Myosis of the pupils was still retained. No corrosion of the mouth, abnormal coloration of the skin, or putrefaction were apparent. Positive findings of mild irritation of the stomach, duodenum and jujenum were noted. The liver was a bit smoky, but there was no gross damage. The spleen and kidneys were normal and the bladder was empty in every case. The heart was dilated in all its chambers. The lungs showed variable degrees of acute edema. The brain showed some congestion and edema.

Pharmacological Investigations: These were carried out by Tawab and Malak in the Pharmacology Department of the Faculty. The results of both the rectus muscle and intestinal preparations treated with aqueous extract of the bread showed a mild anticholinesterase activity. Chromatographic studies also were made with samples of the bread. The separation was accomplished by reverse phase paper chromatography. The paper was treated with 5 per cent vaseline in ether and the chromatogram was developed with ethamol, acetone and water (1:1:2 volumes). The R f† value given, compared with a standard Folidol (a patent parathion preparation), was 0.52.

*At Medicolegal & Abbasieh Faculty of Medicine.
† "The rate of development of color on the paper of chromatogram." (Lederer)

Chemical Detection: The technique followed was the extraction of all samples of the viscera taken as a whole with ether. The final product was the result of three extractions over a period of 24 hours. It had a characteristic vivid orange yellow color. It was divided into several fractions and subjected to tests for the nitro-fraction by the sodium hydroxide, the diazotization technique and the indophenol reactions. Other fractions were tested for the organic phosphorus molecule by transformation to calcium phosphate, treatment with molybdic acid and reduction into molybdium blue by adding sodium sulphite and hydroquinone.

The same tests were made on samples of flour, bread, cakes and rusks sent by the Parquet. Positive reactions for parathion were given only by some samples of the cakes. An interesting point is that the crusts were more heavily loaded with parathion than the inside. The flour gave negative reaction.

Our impression regarding the contamination of the bread and cakes is that the poison reached the loaves and cakes after doughing, in the superficial paint of the loaf which is commonly added in bakeries.

COMMENT

Parathion is a relatively stable organic phosphorus compound that owes its toxic action to its anticholinesterase activity which it exerts on the various tissues of the body, including characteristically the central nervous system owing to its high solubility in lipids[3], voluntary muscles and the myocardium. Its lipid solubility accounts also for its possible absorption from the skin, in addition to the intestinal and pulmonary routes. Another property of this poison is that its absorption occurs without local inflammatory changes; and hence symptoms usually develop only after it has already been absorbed. Of the various types of cholinesterases present in the body, the brunt of inhibition produced by organic phosphate esters falls on pseudocholinesterase[1] which hydrolyzes acetylcholine at the sites of muscarine action and is the type present in blood plasma. This is followed by inhibition of the true cholinesterase which hydrolyzes acetylcholine at the sites of nicotine action, and is the type present in the red blood cells.

One of the characteristic features of the physiology of cholinesterase, shared by other enzymes in the body, is the fact that a considerable reduction of cholinesterase should occur before symptoms develop. The practical inferences from this are outstanding:

the margin between doses producing no symptoms and those causing death is narrow, and when symptoms begin there is little warning of the gravity of the outcome. Further the clinical symptoms lag behind the laboratory detection of extreme inhibition of plasma and red blood cell cholinesterase activity, and conversely, the symptoms may disappear when the R.B.C. activity has just exceeded 15 per cent[5].

Although severe nervous symptoms dominated the clinical picture in the fatal cases during this outbreak, in the cases that survived, the story was different. The average age incidence was 6 years in the former, and 6.7 years in the latter group of cases, but the average interval between the intake of bread and the appearance of symptoms was 28 minutes and 46 minutes respectively. The difference symptomatology and course were obviously related to the dose of the poison. This bears out the experiments of Freedman, et al.[6] on rats intoxicated with D.F.P., which showed that the severity of toxic symptoms paralleled the level of brain cholinesterase.

Freedman and Himwich[7] have gone further to demonstrate a remarkably greater vulnerability of the infant rat to D.F.P. than the adult, probably due to the lower brain cholinesterase concentrations in the young which consequently have a smaller margin of safety. This explains the relatively more severe poisoning in children than in adults simultaneously affected.

Whatever group of symptoms dominated the clinical picture, there was a characteristic sequence of events which when properly analysed becomes of great diagnostic value. Thus the initial symptoms, whether in the fatal or in the less severe cases, were the result of the "muscarine action" of acetyl choline; such were abdominal pain, anorexia, nausea and vomiting, excessive salivation, sweating, pallor, excessive bronchial secretions and some degree of myosis.

These symptoms may later progress to broncho-constriction and pulmonary edema, pin-point pupils, diarrhea and frequency or incontinence of urine. But what is highly characteristic is that the effects of the "nicotine action" of acetyl choline then announce themselves by muscular twitches and fasciculation of the eyelids and later of the facial muscles, together with tremulousness or twitching of the limbs. The clonic convulsions occurring during this outbreak, though higher in incidence than previously reported, were short-lived. Both convulsions and coma were limited to severe cases, eight out of nine being fatal, but giddiness and faint-

ing were common at the onset of the milder types of illness. Furthermore, half of the surviving cases showed a transient cerebellar deficiency.

The effects of parathion on the blood pressure, respiration and pulse, as found in this outbreak (Table I) are interesting. In the fatal cases seen in coma and with failing respiration, shock prevailed (75%), whereas hypertension was more common in the cases that survived than in the fatal cases (50% and 25% respectively). This is borne out by the findings of keratic precipatates

TABLE I. EFFECTS OF PARATHION ON BLOOD PRESSURE RESPIRATION AND PULSE.

	Fatal Cases	Surviving Cases
Number of cases	8	14
Cases with hypertension	2	7
Cases with shock	6	1
Cases with marked tachycardia	6	1
Cases with hyperpnœa	3	2
Cases with apneustic or gasping respiration	5	—

by Dubois, et al.[8] in experimental animals: following single intravenous injection of parathion, the blood pressure changes were irregular, but a second injection leading to cessation of respiration was accompanied by a fall of blood pressure which was sometimes preceded by an evanescent anoxic rise. This is at variance with the findings of H. R. Chamberlin, et al.[1] in the two children on which they reported; both had tachycardia and hypertension which they explained on the basis of stimulation of the adrenal medulla by acetyl choline released by preganglionic fibres, leading also in the fatal case to hyperglycemia (never reported by others). It may be added that in adults hypertension is stated to be common in severe cases.[9] In the present cases, it seems more likely, at least in the fatal cases, that the blood pressure changes were the result of the effect of the poison and the anoxia on the vasomotor centre in the medulla oblongata. Again the type of respiratory failure was reminiscent to that of central origin. This is in agreement with the previous suggestion of Grob,[9] although Dubois, et al. state that in dogs "death was apparently from respiratory failure of peripheral origin". In our cases there was, in addition, some evidence of pharyngeal palsy, which supports our suggestion of brain stem inhibition.

It is remarkable that the surviving cases, on the other hand, improved so rapidly. Again this is reminiscent of the results of

animal experiments by various workers among which were those stated by Kenneth[10] about the recovery of cholinesterase activity and the disappearance of symptoms a few hours after single sublethal doses of these poisons. After repeated doses, however, an irreversible inactivation occurs and leads to cumulative toxic action. In the absence of information from direct analysis of the material responsible for poisoning, great help may be obtained from determination of the plasma cholinesterase activity, which is in fact a very sensitive index of poisoning with a phosphate ester. Another simple and promising method, developed lately by Waldman, et al., is the detection in the urine of paranitrophenol, a degeneration product of parathion in the body[11]. In the treatment of poisoning by these agents, it is generally agreed that atropine is the most effective remedy, but to be successful it should be given in relatively large doses, which these patients tolerate well, over a long enough period of time. For an adult, up to 2 mgm. atropine each hour may be needed for the control of symptoms[12]; smaller doses should be maintained for several days. However, atropine is known to be effective in reversing the muscarine but not the nicotine actions of anticholinesterase poisons, and it has only a weak effect on the central nervous system manifestations. Fortunately, experimental evidence (Du Bois, et al.) indicates that atropine can prevent or reverse the respiratory and circulatory effects of parathion, but it was shown to have no protective effect against the brain cholinesterase. It is interesting that Du Bois, et al. have given evidence that inhibition of the latter by parathion can be markedly reduced by eserine. This is explained on the basis of the antagonism of eserine and cholinesterase. They claimed a combination of atropine and eserine was a protection against the lethal action of the drug, but the place of such combination in human therapy has not been assessed insofar as we know. Other important factors in successful treatment are the drainage of secretions in the mouth and bronchi, oxygen inhalation for all cases with severe respiratory complications and artificial respiration in respiratory paralysis. Removal of unabsorbed parts of the drug by stomach wash or cleansing of the skin are essential to first aid. Chamberlin, et al. have studied the possible beneficial effect of meat protein during the recovery period on the basis that it was previously shown to accelerate plasma cholinesterase synthesis in rats.

SUMMARY

In a large outbreak of parathion poisoning involving adults and children the fatality was limited to the latter. Of 22 cases treated at the Children's Hospital, Abbassieh Faculty of Medicine, eight died (36.4%). The symptoms are described in children and their correlation with the pharmacology and toxicology of the insecticide, as well as the differential diagnosis, are discussed. The post-mortem appearances and method of detection of the poison are given. A comment is made on the laboratory diagnosis and treatment of the condition.

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DEAFNESS PREVENTION IN CHILDREN

EDMUND PRINCE FOWLER, SR., M.D.*
and
ELEANOR C. RONNEI, M.A.**
New York

This is the first of several articles on deafness in babies and young children. The articles are addressed to the pediatrician who is usually the first physician to examine a child regularly and is, therefore, in the best position to note any deviation in the acuity of hearing, or in the complex speech-language structure that is dependent upon the normal functioning of the ear. Our purpose is not to describe the already known and classic symptoms of severe deafness, but to discuss the mild to moderate losses which are most often reversible if treated in time.

Each of our articles will deal briefly with a specific type of deafness because each of the several classifications of deafness—obstructive, neural, and non-peripheral or central deafness—requires slightly different techniques for its early detection, management and treatment.

We shall begin with a discussion of obstructive deafness. This type or classification is a malfunction that most frequently begins in early childhood as a result of children's diseases complicated by otitis media or as a result hypertrophied lymphoid tissue in the nasopharynx. Congenital occlusions, although not often found, are another cause of obstructive deafness. Permanent and damaging hearing loss can be prevented in the majority of these cases by the skillful observation and care of the pediatrician and consulting otologist, and by the cooperation of the child's parents.

Even where the hearing loss cannot be much improved, if at all, by medical and surgical care, most children with mild to moderate obstructive deafness can develop normal or nearly normal speech and language with the use of a hearing aid and the help of a speech and hearing therapist.

Without early observation and care of outer and middle ear conditions, almost immediate and damaging changes may develop.

* Dr. Fowler is Chairman of the Subcommittee on the Hard of Hearing and the Deaf of the Council on Public Health and Education of the Medical Society of the State of New York.
** Mrs. Eleanor C. Ronnei is a consultant to the Subcommittee and Administrative Director of the New York League for the Hard of Hearing.

The effects of these changes may almost immediately be seen in the area of the child's speech and language, in his behavior and in his whole concept of the world around him.

Again, without help from a speech and hearing therapist, the child may not accept and use his hearing aid to best advantage; he will tend to leave off word endings; he will not learn the meanings of new words or their proper pronunciation easily; his vocabulary will remain static during the period when growth in this area is usually most rapid; he may not be ready for school at the average age.

Therefore, we may well ask ourselves—what is the best way to detect deafness early before it does permanent harm? What treatment of middle ear infections is most successful in preventing permanent damage to the ear? How can the pediatrician manage an established obstructive lesion to permit the optimum mental, emotional, and social development of his little patient?

The prevention of obstructive, or conductive deafness can often be effected by proper biochemical or antibiotic therapy during the course of a childhood disease, and its aftermath, suppurative otitis media. If these medications are used, more than one dose, usually at least three or four, should be given. Of course, if pus is present, the antibiotic or biochemical will not remove it. Pus should be evacuated by incision of the drum membrane, or, where indicated, a mastoid operation. Unwarranted and continued use of antibiotics will only mask the symptoms of ear disease and may result in subsequent severe complications and permanent deafness. Prevention, therefore, is the first and most effective way of conserving hearing in young children.

Our next suggestion for protecting a child from lifetime deafness is a careful hearing test to be given after the child has recovered from any disease affecting the ear. After skillful and thorough questioning of the parent about the child's response to sound in general and in particular, a simple hearing test may be performed by the pediatrician in his office, preferably using a pure tone audiometer

Lacking an audiometer, the pediatrician may gain an idea of a child's hearing for low tones by testing him with approximations of these tones made by lightly hitting a bass drum, a skin tambourine, or some such resonating object, or by humming a bass

note. The pediatrician will observe the response to these low frequency sounds, comparing the child's reactions to those of normal hearing children of the same age. The 125 and 250 cycles per second tuning forks can also be used to test these suspect tones.

Following the office test, the pediatrician may ask the parent to observe the child at home and report back on his response—in comparison to normal hearing siblings and playmates—to such low-pitched home sounds as a knock on the door, a dog's growl, distant thunder and high-flying airplanes. The pediatrician will also want to know if the child localizes the sound properly, if he turns up TV and radio louder than he did before the ear disease or if he sits closer to these instruments now. He will also want to know if the child hears like other children when the source of sound is out of sight, or if he does not understand soft speech over the telephone

If the pediatrician is not now entirely satisfied that the child's hearing i- ormal, he should refer the child to an otologist for a complete hearing evaluation. Low-tone deafness, detected early by these simple measures, can often be treated to bring about a most satisfactory result

Hearing loss due to disease of the middle ear, like all diseases, may be irreversible in spite of our best efforts. In apparently irreversible low-tone deafness, the pediatrician can still serve his young patient well by supporting the otologist's recommendations for a hearing aid and speech and hearing therapy, when indicated.

A very young child accepts his hearing aid quite naturally and almost immediately begins to use it happily and with great satisfaction. His parents, however, have a much harder time because they have "built-in" prejudices against disclosing the imperfection of their child.

The pediatrician is in the best position to lessen the parental opposition to surgical, medical treatments, or to devices such as hearing aids. He can also impress upon the parent the need for services of the speech and hearing therapist.

We have discussed, very briefly, the prevention of low-tone obstructive deafness, its early detection and its management, as it could and should be handled by a cooperative and united team consisting of the parents, the pediatrician, the otologist and the teachers.

It is suggested that the pediatrician seek information about community resources for his young hearing-impaired patients from the local medical society, speech and hearing clinics in hospitals and universities, and from the American Hearing Society and its local chapters like the New York League for the Hard of Hearing in New York City. They can give specific help regarding hearing aid evaluation, speech and hearing therapy and parent counseling.

Subsequent articles in this series will deal with neutral deafness, peripheral and central, single and combined.

WOODRUFF, C. W.: MULTIPLE CAUSES OF IRON DEFICIENCY IN INFANTS. (Journal American Medical Association, 167:715, June 7, 1958).

An attempt has been made to determine whether the composition of a group of anemic infants differs from that of the population from which they are drawn. The most significant predisposing factors found were low birth weight, high birth order, twinning and masculinity. Similar findings were recently reported by Guest and Brown. The poor diets eaten by these infants are similar to those of a much larger number of infants who did not develop anemia of the same degree of severity. Consequently, severe hypochromic anemia in infancy does not occur solely as the result of a deficiency of iron intake. Prematurity or a birth weight of less than 3,000 gm. (6.5 pounds) is the most common predisposing factor. Prematurity was present in 80% of the patients with a hemoglobin concentration of less than 5 gm/100 cc. Reduction of the iron supplies at birth may be due to maternal iron deficiency or fetal blood loss. Unrecognized instances of fetal blood loss may compromise the infant's iron economy without jeopardizing his life. Perinatal hemorrhage may also be an explanation for the high incidence of hypochromic anemia in twins. The more frequent occurrence of hypochromic anemia in male infants is a reflection of their relative immaturity and increased growth rate. The prevention of hypochromic anemia depends largely on the recognition of the susceptible infants in the population. This group should be given adequate doses of medicinal iron prophylactically, and should be carefully watched for the development of anemia. AUTHOR'S SUMMARY

Abstracts

Edited by

MICHAEL A. BRESCIA, M.D., NEW YORK

Prichard, J. S.: Abdominal Pain of Cerebral Origin in Children. (Canadian Medical Association Journal, 78:665, May 1, 1958).

Nineteen children with abdominal pain of presumed cerebral origin were studied. It was found that they could be divided into two clinical groups. The first, and much the commoner, was characterized by attacks lasting an hour or more and often associated with vasomotor disturbances, nausea, vomiting or headache. Drowsiness was common during the attack. There was a family history of migraine in the majority of the children and the electroencephalograms were normal or showed a mild generalized dysrhythmia. It is suggested that these children are examples of abdominal migraine. The second group is characterized by attacks lasting five or ten minutes and associated in some instances with confusion, vasomotor disturbances, nausea or vomiting. A family history of migraine is not characteristic and the electroencephalogram shows evidence of discharges in the temporal region. It is felt that these are examples of abdominal epilepsy. From a therapeutic point of view, it is a mistake to call the first group "epilepsy" because the anxiety so engendered in the family group tends to make attacks more frequent. AUTHOR'S SUMMARY

Zetterström, R.; Strindberg, B. and Arnhold, R. G.: Hyperbilirubinemia and ABO Hemolytic Disease in Newborn Infants of Diabetic Mothers.[1] Acta Paediatrica, 47:238, May 1958).

In twenty-nine consecutive cases of newborn infants of diabetic mothers, the serum bilirubin levels during the neonatal period have been studied. These infants are predisposed to the development of hyperbilirubinemia. The average bilirubin levels for the group exceeded those of normal newborn infants. In the majority of these infants, hemolytic disease or other causes of jaundice could be excluded. The hyperbilirubinemia was considered to be the result of functional immaturity of the liver. The diagnosis of ABO hemolytic disease was made in five of the patients. The high frequency of this complication seems to indicate that the development of this disorder is favored in pregnancies complicated by diabetes. AUTHOR'S SUMMARY

McDONALD, A. D.: MATERNAL HEALTH AND CONGENITAL DEFECT. A PROSPECTIVE INVESTIGATION. (New England Journal of Medicine, 258:767, April 17, 1958).

A description of events during the first twelve weeks of pregnancy and of other maternal characteristics was recorded for 3295 women at their first prenatal examination. Seventeen were found not to be pregnant, and 62 could not be traced. The remaining 3216 pregnancies resulted in 68 spontaneous abortions, 74 stillbirths and neonatal deaths (excluding those with major congenital defects), 50 congenital defects classed as major and 72 as minor, and 2987 apparently normal infants. There were 119 premature births (excluding those associated with major defects, multiple birth and induced labor). Mothers of the 72 infants with minor defect and of the 119 premature infants did not differ in any respect studied from the mothers of normal infants and so were included with these in subsequent comparisons. As compared with mothers of normal infants, a higher proportion of those of infants with major defects had an acute febrile illness or pulmonary tuberculosis, or had been engaged in certain types of heavy work in early pregnancy. Women who aborted also had an excess of acute febrile illness but not of the other factors. The stillbirths and neonatal deaths were associated with a raised incidence of acute illness, anemia and vaginal blood loss. Mothers in all three abnormal groups had had an increased rate of fetal loss in earlier pregnancies.

AUTHOR'S SUMMARY

ILLINGWORTH, R. S.: DISSOLUTION AS A GUIDE TO DEVELOPMENTAL ASSESSMENT. (Archives Disease in Childhood, 33:118, April 1958).

In assessing the development of an infant or young child, one should always note the relationship of one milestone of development to another, in order to assess the rate of development, and the relationship of milestones in one field of development to those in another. Not infrequently, development in one field is out of step with that in another. This might be termed dissociation. The reasons for this imbalance are discussed.

Isolated delay in motor development may occur without apparent reason, so that the child grows up to be perfectly normal. More often it results from a physical disability, in particular hypotonia or hypertonia. It never signifies mental deficiency. Relative advancement in motor development in relation to other fields occa-

sionally occurs in mentally defective children. Unusual and isolated advancement in motor development does not mean superior intelligence. Retardation in social behavior is of considerable prognostic significance, implying a poor prognosis for intelligence. The degree of retardation in a child with retardation in other fields is of great importance: only slight social retardation with severe motor retardation may occur in the presence of a severe mechanical disability, such as cerebral palsy, with an only slightly lowered intelligence. Advanced social development is a good index of superior intelligence, except that it is difficult to assess in figures. Isolated delay in speech frequently occurs in children of normal or superior intelligence, and never means mental deficiency. Only moderate retardation in speech in the presence of severe retardation in other fields (as in cerebral palsy) excludes severe mental deficiency. Isolated advancement in speech is a good sign of superior intelligence. Isolated delay in sphincter control is commonly associated with mismanagement or with familial factors, and is of no importance in developmental assessment. Advancement, relative or absolute, is of little value because of the difficulty in assessing its significance (i.e., whether the control is really voluntary and not mere conditioning). Delay in chewing may result from mismanagement, and otherwise does not occur alone.

AUTHOR'S SUMMARY

CLATWORTHY, H. W., JR. AND MCDONALD, V. G., JR.: OPTIMUM AGE FOR SURGICAL CLOSURE OF PATENT DUCTUS ARTERIOSUS. (Journal American Medical Association, 167:444, May 24, 1958).

Surgical closure of a patent ductus arteriosus should be carried out on any child who shows symptoms as early as the diagnosis is established and in asymptomatic patients before they reach the age of 5 years. The operative morbidity and mortality in infants and younger children, as far as we can determine, is no greater than that experienced in older children. Failure to eradicate this lesion in early life may expose the infant with symptoms to progressive myocardial decompensation and the young child to the needless threat of cardiorespiratory disability, growth failure which may not be entirely reversible, and to such additional serious complications as endarteritis, irreversible pulmonary hypertension, and degenerative disease of the major and minor pulmonary vessels.

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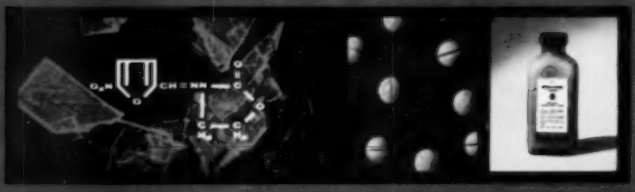

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